FOREST PEST CONDITIONS IN CALIFORNIA ¾ 1998

A Publication of the California Forest Pest Council

THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council was founded in 1951 as the California Forest Pest Control Action Council. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, biologists, and others interested in the protection of forests from damage caused by biotic and abiotic agents. The council's objective is to establish, maintain, and improve communication among individuals who are concerned with these issues. This objective is accomplished by four actions:

1. Coordination of detection, reporting, and compilation of information on biotic and abiotic agents, primarily forest insects, diseases, and animal damage.

2. Evaluation of conditions centered upon forest insects, diseases, and animal damage.

3. Control recommendations made to forest managing agencies and landowners.

4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The California Board of Forestry recognizes the Council as an advisory body in forest health protection, maintenance, and enhancement issues. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, **FOREST PEST CONDITIONS IN CALIFORNIA ¾ 1998**, is compiled for public and private forest land managers and other interested parties to keep them informed of conditions on forested land in California, and as an historical record of forest insect and disease trends and occurrences. The report is based largely on information provided by three sources: (1) the statewide Cooperative Forest Insect and Disease Survey, in which federal, state, and private foresters and land managers participate, (2) information generated by Forest Pest Management, Pacific Southwest Region, USDA Forest Service, while making formal detection surveys and biological evaluations, and (3) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection.

The report was prepared by the USDA Forest Service, Pacific Southwest Region, State and Private Forestry, in cooperation with other member organizations of the Council, printed by the California Department of Forestry and Fire Protection, and distributed by the two agencies.

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FOREST PEST CONDITIONS - 1998

SUMMARY

INSECTS

Top-kill and tree mortality from attacks by bark beetles and wood borers were at or below historic norms in 1998 with few exceptions, primarily the Lake Tahoe Basin or adjacent areas. No doubt the ample precipitation of the past few years has played a large role in this ``greening''. Because bark beetle activity is at or near normal in many areas the State Board of Forestry voted in April to dissolve the South Sierra Zone of Infestation and reduce the Central Sierra and Sierra Cascade Zones of Infestation to a single residual Zone encompassing the Lake Tahoe Basin Management Unit and named the Tahoe Area Zone of Infestation for Bark Beetles

The California and Modoc budworms caused light and limited defoliation. However, the Douglas-fir tussock moth defoliated white fir on 44,000 acres of the Sequoia National Forest and the Sequoia-Kings Canyon National Parks. About 61% was on the National Forest, 35% on the National Parks, and 4% on private lands. Heavy defoliation occurred on about 5,800 acres, or 13% of the total infested area and is restricted to areas within the National Parks and the Hume Lake District of the National Forest. This is by far the most significant event in forest entomology in 1998.

DISEASES

Cool and wet spring weather due to El Niño weather conditions favored the development of foliage and twig diseases. Diseases on conifers included Diplodia blight of pines, Elytroderma needle disease and Douglas-fir needle cast. Hardwood leaf and shoot blight included two species of fungi causing leaf spots on California black oak, a leaf spot and powdery mildew on blue oak, and shoot and leaf blights on cottonwood and aspen.

Pitch canker continues to intensify within California's three native Monterey pine stands and elsewhere within coastal California. The disease was discovered for the first time in Solano County at a Christmas tree farm near Dixon. This represents a significant jump for the disease since this location is hotter and drier than any other known site.

FOREST INSECT CONDITIONS - 1998

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

M261D - Southern Cascades . A small pocket of ponderosa pine mortality was associated with western pine beetle north of Lake Britton near the PG&E campground, Shasta National Forest. Small pockets of mortality were also detected in several locations on the Hat Creek District, Lassen National Forest. Specific areas include: two pockets near Snow Mountain and one pocket just northeast of Blue Lake; in the Burney Spring area; near Huckleberry Mountain; just north of the Forest Service Campground at North Battle Creek Reservoir; along Forest Service Road 32N01Y one mile northeast of North Battle Creek Reservoir; and near Heart Lake.

M261B - Northern California Coast Ranges. Western pine beetles continued to attack and kill a small group of ponderosa pine north of Upper Lake, Lake County. The beetle activity is believed to be a residual effect of the recent Forks Fire.

M261E - Sierra Nevada. Throughout the northern end of the Sierra Nevada Range, mortality caused by western pine beetle has returned to pre-drought or background rates. Small mortality pockets of 2 to 5 trees can be seen around the forests, primarily associated with overstocked stand conditions. One noteworthy mortality area is about 2 miles south of Table Mountain, Feather River District, Plumas National Forest.

Mortality associated with the western pine beetle remained generally low in the central and southern Sierra Nevada, appearing as scattered individual or small groups of ponderosa pine. Western pine beetles continue to be associated with ponderosa pine mortality in the Diamond-O and Pines Campgrounds, Groveland District, Stanislaus National Forest. Most of these trees had also been attacked by the red turpentine beetle. Western pine beetles were associated with low to moderate levels of ponderosa pine mortality near Fraser Flat, Miwok District, Stanislaus National Forest, in stands thinned and underburned in 1997. Small groups of ponderosa pine mortality were also observed in the Miami Creek Basin, Mariposa District, Sierra National Forest, and along the South Fork of the Merced River, Wawona District, Yosemite National Park.

PINE BARK BEETLES AND PINE ENGRAVER BEETLES, *Dendroctonus* spp. and *Ips* spp.

M262A - Central California Coast Ranges and M262B¾ Southern California Mountains and Valleys. Pine mortality and dieback which could be attributed to *Dendroctonus* and *Ips* species were exceptionally low on public lands in these two sections in 1998.

PINE ENGRAVER BEETLES, *Ips* spp.

M261E - Sierra Nevada. Pine engraver activity continued at background levels in the central and southern Sierra Nevada. Low rates of activity were reported in thinning slash from creation of a fuel break on the Minarets District, Sierra National Forest.

PINYON IPS, *Ips confusus*

M262B - Southern California Mountains and Valleys. Mortality of singleleaf pinyon continued in a 5,500-acre area in the eastern San Bernardino Mountains which is infected with blackstain root disease. Infected trees succumbed to attack by pinyon ips. In the Santa Rosa Mountains, pinyon ips continued to kill *Pinus californiarum* ssp.*californiarum* in the vicinity of the 1994 Palm Fire.

FIR ENGRAVER, *Scolytus ventralis*.

M261A - Klamath Mountains and **M261B - Northern California Coast Ranges**. The number of dying true firs was greatly reduced from 1997.

M261D - Southern Cascades. White fir mortality was detected in a mixed stand in the Burney Springs area, and around Snow Mountain and Blue Lake on the western edge of the Hat Creek District, Lassen National Forest. Large pockets of fir mortality were noted on the Almanor District, Lassen National Forest, between Blue Lake and Ridge Lake along Forest Service Road 29N02Y and along Road 29N18 northwest of Buzzard Springs. Otherwise, fir mortality continued to decrease across most of this section.

M261E - Sierra Nevada. True fir mortality is at background levels over all of the northern part of this section. Aerial survey found one area about 2 miles south of Table Mountain, Feather River District, Plumas National Forest. White fir mortality on the east side of the northern Sierra Nevada has subsided compared to the early 1990s. Some top kill can be observed on a few trees here and there. On the Beckwourth District, there is some continuing fir mortality along Forest Service Road 24N10 two miles west of Lake Davis. Some eastside stands that have a high component of white fir and are generally overstocked will likely be areas of high mortality during the next protracted drought period.

On the Truckee District, Tahoe National Forest, there is a pocket of true fir mortality along Forest Service Road 03 between Barker Pass and Laddies Cove. To the south, mortality and top-kill associated with fir engraver activity continued to be low in the central and southern Sierra Nevada.

M262B - Southern California Mountains and Valleys. Much white fir top-kill and some mortality was observed in the San Gabriel, San Bernardino, and San Jacinto Mountains. All size classes appear to be affected, although older trees were particularly so. The fir engraver is assumed to be at least partially responsible for the damage, although many trees examined were also infected with true mistletoe. Annosus root disease and the roundheaded fir borer are also commonly involved in fir mortality in southern California.

RED TURPENTINE BEETLE, *Dendroctonus valens.*

M261D - Southern Cascades . Attacks were common on ponderosa pines injured during prescribed burns on McCloud Flats, Shasta-Trinity National Forests.

M261E - Sierra Nevada. Red turpentine beetle activity seems to have increased over the past three years in concentrated areas associated with management activities, primarily prescribed fires and thinning projects. To date, there has been minimal, if any, mortality associated with attacks by this beetle. Red turpentine beetle activity was noted this spring in the Volcano plantation, Foresthill District, Tahoe National Forest, following a prescribed fire conducted in November of 1997 and in a thinning project on private lands in Delleker, Plumas County. Attacks continue, but are fewer in number, in areas where prescribed fires were conducted in previous years on the Lassen National Forest and in Lassen Volcanic National Park.

Low levels of red turpentine beetle attack continued in pine stands near Fraser Flat, Miwok District, Stanislaus National Forest, following thinning and underburning. Numerous red turpentine beetle attacks were found in a 35-year-old Jeffrey pine plantation on trees heavily injured during a prescribed burn near Alta Summit, Greenhorn District, Sequoia National Forest. With the exception of the Alta Summit plantation, little mortality has been associated with the red turpentine beetle attacks. Reduced levels of red turpentine beetle attack continued for the fourth year on ponderosa pines in the Diamond-O Campground, Groveland District, Stanislaus National Forest. Since 1995, 16 of 37 trees attacked by the red turpentine beetle have died; all 16 trees that died were also attacked by the western pine beetle and/or woodborers.

M262B - Southern California Mountains and Valleys. The red turpentine beetle was common on trees injured or killed by wildfire

and prescribed fire in southern California.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*.

M261A - Klamath Mountains . Mortality of all host species from all causes, including mountain pine beetle, was substantially lower in 1998 than in 1997.

M261D - Southern Cascades. Lodgepole mortality was observed north of Upper and Lower Twins Lake and between Box Lake and Lake Eiler in the Thousand Lakes Wilderness, Hat Creek District, Lassen National Forest.

M261E - Sierra Nevada. High rates of lodgepole pine mortality continue on the Truckee and Sierraville Districts, Tahoe National Forest, in riparian areas and frost pockets where lodgepole pine is concentrated. Typical of mountain pine beetle attacks, most trees are in monoculture stands of lodgepole, are greater that 80 years old and are greater than 8-10 inches dbh. Mountain pine beetle mortality areas to note on the Sierraville Ranger District are just north of the Cold Creek Campground and along Onion Creek, both of these areas are on Highway 89. One other area is along Rock Creek, two miles east of Lewis Mill. On the Truckee Ranger District mortality pockets include: the Sagehen Creek basin, Alder Creek, at the Highway 269 and Interstate 80 junction, at the south side of the Highway 89 and Interstate 80 junction, in the North Star Ski area, and in several areas between Silver Creek Campground and the Deer Park picnic area on Highway 89 south near Squaw Valley.

Mountain pine beetle activity continued generally low in the central and southern Sierra Nevada. Exceptions were areas of lodgepole pine mortality in the southern end of the Lake Tahoe Basin, along Pioneer Trail and other localized areas in the vicinity of Myers and the Upper Truckee-Angora Creek drainage.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*.

M261D - Southern Cascades. A small pocket of Jeffrey pine mortality was detected just west of West Prospect Peak, Hat Creek District, Lassen National Forest. A chronic level of Jeffrey pine mortality continues on private land near Goodrich Mountain, Lassen County. Mortality has been ongoing in this area for about four years at the rate of 5 to 10 trees per acre per year.

Elsewhere, Jeffrey pine mortality in Lassen Volcanic National Park and on the Lassen National Forest has returned to background rates following the past three years of adequate precipitation. A few beetle killed trees can still be found in overstocked stands and in those that have dense understories of white fir that are out competing the pines on the sites.

M261E - Sierra Nevada. The only Jeffrey pine beetle activity noted for the Plumas National Forest was around the Spanish Creek Campground along Highway 70 just north of Keddie.

Jeffrey pine mortality has decreased on the Truckee District, Tahoe National Forest from previous years; however, there still are a few areas of continuing mortality. Areas to note include: the north side of Interstate 80 between Truckee and Donner Lake on Forest Service and private lands, in the Cold Creek drainage south of Horseshoe Bend, and on the west side of Highway 89 across from Goose Meadow Campground. Group kills in this area over the past two years have included large pockets of up to 200 trees in the Northwoods area. This year group kills are in the range of 5 to 10 trees per group. It is likely that Jeffrey pine beetles will stay active in this area for a few more years with mortality levels continuing to decrease as stands are thinned and precipitation levels stay at or above normal.

In the Lake Tahoe Basin, concentrations of mortality occurred around the south shore of Lake Tahoe, including the vicinity of Myers and the Upper Truckee-Angora Creek drainage. Low levels of Jeffrey pine mortality also continued around Inyo Craters, Mammoth District, Inyo National Forest. Elsewhere throughout most of the central and southern Sierra Nevada, Jeffrey pine mortality continued at background.

Because bark beetle activity is at or near normal throughout most of California, the State Board of Forestry voted in April to dissolve the South Sierra Zone of Infestation and reduce the Central Sierra and Sierra Cascade Zones of Infestation to a single residual Zone encompassing the Lake Tahoe Basin Management Unit and named the Tahoe Area Zone of Infestation for Bark Beetles.

DOUGLAS-FIR BEETLE, *Dendroctonus psuedotsugae*

M263A - Northern California Coast. A group of 18 Douglas-fir at Russian Gulch State Park (Mendocino County) were attacked and killed by Douglas-fir beetle during the past two years. Most of the trees were attacked in the spring of 1997, apparently as a result of beetle populations increasing in nearby windthrown trees. In the absence of additional windthrow, beetle attacks are not expected to continue.

PINE REPRODUCTION WEEVIL, *Cylindrocopturus eatoni*

M261E - Sierra Nevada. The pine reproduction weevil continued to cause damage to pine plantations on the Groveland District, Stanislaus National Forest in 1998. About 517 acres had mortality ranging from 21% to 38% of current stocking and an estimated 846 acres had mortality within the 11% to 20% range. Suppression was conducted over 567 acres. Late summer surveys found that pine reproduction mortality was present in a plantation previously unaffected. In addition, the weevil was detected on about 1,000 acres of pine plantations on the Mariposa District, Sierra National Forest with mortality rates similar to those on the Groveland District.

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*.

M261D - Southern Cascades, M261E - Sierra Nevada, and M261G - Modoc Plateau. Pheromone trap catches for 1997 decreased substantially for all plots on state and private land in northeastern California (Shasta, Modoc, Lassen, and northern Plumas Counties). Average plot catches ranged from 0 to 8 moths per trap.

M261E - Sierra Nevada. Douglas-fir tussock moth populations reached outbreak on white fir in locations on the Sequoia National Forest and the Sequoia-Kings Canyon National Parks in 1998. About 44,000 acres are affected- 27,000 acres are in the National Parks, 15,500 acres on the Sequoia National Forest, and 1,500 acres on state and private lands. Heavy defoliation has occurred on about 5,800 acres or 13% of the infested area and is restricted to areas within the National Parks and the Hume Lake District, Sequoia National Forest. Many of the heavily defoliated stands are in high-use recreation areas. Heavily defoliated areas in the Kings Canyon National Park include the Grant Grove Visitor Center, Sunset and Crystal Springs Campgrounds, the Grant Grove Stables, Panoramic, Wilsonia, and along the Generals Highway from the Big Stump entrance and the ``Wye'' to Quail Flat and Buena Vista. Heavy defoliation is also evident to white fir in the area of Redwood Saddle and Redwood Sequoia Grove . Heavily affected areas in the Sequoia National Park include stands on Pine Ridge, Little Baldy, Giant Forest and near Atwell Grove in Mineral King. Areas on the Hume Lake Ranger District include Chimney Peak, Quail Flat, stands above Bacon and Corral Meadows and along Park Ridge north of the National Park. Very light defoliation was found on the Hot Springs Ranger District between Bull Run Peak and Portuguese Pass, including Panorama Campground. In addition, very light feeding injury was observed over about 1,000 acres on the Minarets District, Sierra National Forest in the vicinity of Fish and Ross Creeks.

MODOC BUDWORM, *Choristoneura retiniana*.

M261G - Modoc Plateau. Defoliation was noted in three areas in the northern part of the Warner Mountains, Warner Mountain District, Modoc National Forest. The areas included about 78 acres near Del Pratt Springs, 86 acres near Fandango Peak, and 106 acres in the North Star Basin.

LODGEPOLE PINE NEEDLEMINER , *Coleotechnites milleri*.

M261E - Sierra Nevada. Lodgepole needleminer populations continue to increase in the Tenaya Lake Basin and along Highway 120 west of Tenaya Lake in Yosemite National Park. Larger areas of visible defoliation, but little tree mortality, are expected in the near future. Populations remain low within the Highway 120 corridor that forms the zone of high-visitor use in Tuolumne Meadows**,** and no visible defoliation is anticipated over the next 4 to 6 years. Extensive areas of high needleminer populations are known to exist north and south of the corridor.

PINE NEEDLE SHEATHMINER, *Zelleria haimbachi*

M261D - Southern Cascades and M261E - Sierra Nevada. Abundance of pine needle sheathminer on ponderosa pine east of Pondosa, Siskiyou County (old Pondosa burn) increased slightly. A survey conducted this spring found an average of 1.9 larval mines per shoot, compared with 0.9 and 1.4 mines per shoot during the previous two years and 9.4 mines per shoot during the outbreak year of 1994. Defoliation from the miner was obvious but not severe. Other areas where defoliation was observed include plantations just south of Goose Valley, Shasta County, and near Milford, Lassen County. Samples from near Goose Valley indicate a sizeable population at that location.

CALIFORNIA BUDWORM, *Choristoneura carnana californica*

M261A - Klamath Mountains. The California budworm caused very light defoliation on Douglas-firs around Trinity Lake, Trinity County. The first instar larvae apparently emerged from their overwintering hibernacula at about the normal time in the spring; however, the Douglas-fir did not flush new foliage until early June due to cool spring weather. Larvae and feeding damage could be found in scattered locations such as Papoose Ridge, Feeney Ridge, Feeney Gulch, and Trinity Mountain. The most visible overstory defoliation, which was still light, was on Bowerman Ridge and in Bear Gulch. The defoliation was most visible on suppressed, understory Douglas-firs. Some of these had moderate to heavy defoliation. This is the third consecutive year of visible, but light defoliation.

PACIFIC TENT CATERPILLAR, *Malacosoma constrictum*

M261C - Northern California Interior Coast Ranges. Pacific tent caterpillars on blue oak started hatching at the beginning of April in the Cottonwood area, about a month later than would be expected during a drier year. Defoliation from the insect was mostly unnoticeable in the northern end of the Sacramento Valley, except for defoliation in the west Cottonwood to Happy Valley area, where some ridgetop trees were completely defoliated.

SATIN MOTH, *Stilpnotia salicis*.

M261D - Southern Cascades . There was visible defoliation of a small stand of aspen by the satin moth near Little Shasta Meadow on the Goosenest District, Klamath National Forest.

CEDAR SCALE, *Xylococculus macrocarpae*

261A - Central California Coast . In Pebble Beach, Monterey County, the ``Lone Cypress,'' as well as other nearby Monterey Cypress, have infestations of the incense-cedar scale, *Xylococculus macrocarpae*. The Pebble Beach Company is taking measures to improve the growing site for the Lone Cypress and control the scale.

GYPSY MOTH, *Lymantria dispar*

Statewide. Six male moths were trapped in 1998 by personnel of the California Department of Food and Agriculture, five in detection traps and one in quarantine traps. Counties involved and the number per county were: Mariposa (1), Merced (1), San Diego (1) and Sonoma (3). This is the same number as captured in 1997, but six counties were involved in 1997. There were no reported properties with egg masses or pupal cases.

FRUITTREE LEAFROLLER, *Archips argyrospilus*.

M262B - Southern California Mountains and Valleys. Light defoliation of black oak was observed in the vicinity of Lake Gregory and communities between Rimforest and Running Springs in the San Bernardino Mountains. The fruittree leafroller population in the vicinity of Lake Gregory causes visible defoliation almost every year. Defoliation along the Rim of the World Highway between Rimforest and Running Springs is usually not visible, thus there was in increase in the insect population this year.

AFRICANIZED HONEY BEE, *Apis mellifera scutellata*

322B - Sonoran Mojave Desert and 322C - Sonoran Colorado Desert. The first naturally migrating swarm of Africanized honey bees was found in Los Angeles County in November. The bees were also found in Lytle Creek, Oak Glen, and Hemet. The area colonized by Africanized honey bees is estimated at 34,830 square miles, and includes all of Imperial and San Bernardino Counties, and part of Los Angeles, Riverside, and San Diego Counties. The San Bernardino National Forest is now within the territory of the bee.

The known territory of the Africanized honey bee is based upon bees involved in stinging incidents, captured swarms, and foraging bees netted for research purposes. Initial identification of the bees is based upon morphometric characteristics and confirmed by analysis of mitochondrial DNA. Africanized honey bees were also found in Nevada for the first time this year, and were involved in a stinging incident there. Thirteen multiple stinging incidents in 1998 (as of 10/30/98) raised the cumulative total of such incidents in California to 16 with no human fatalities, although three domestic dogs have been killed.

Other Reports in California in 1998

Insects Where Examined or Reported

Common Name Scientific Name Host County Remarks

A willow scale Unknown Willow San Bernardino Dieback and mortality near the Deerlick Fire Station

Alder flea beetle *Macrohaltica ambiens* Several hardwoods, pine plantation Nevada

Cedar tree borer nr. *Semanotus ligneus* Juniper Lassen Small area of private ownership

Elm leaf beetle *Xanthogaleruca luteola* Elms Lassen Ornamentals

Scythropus weevil *Scythropus elegans* Ponderosa Placer 20 acres, sapling

FOREST DISEASE CONDITIONS - 1998

ABIOTIC DAMAGE

AIR POLLUTION, OZONE

M261E - Sierra Nevada. Twenty-seven ozone injury monitoring sites distributed throughout the Sequoia National Forest were revisited in October of 1998. These sites were first established in 1977 between elevations of 4,000 and 8,000 feet and have been visited every two years since that time. Ponderosa and Jeffrey pines are rated for ozone injury by assessing needle retention and the amount of chlorotic mottle on foliage. Changes in injury since the plots were last evaluated in 1996 were minor. Eight plots showed increased injury, 11 showed less injury and the remaining eight were unchanged. Trees with air pollution injury can be found at all elevations, but most are concentrated at elevations of 6,000 feet and below.

DESICCATION INJURY AND DROUGHT STRESS

M261E - Sierra Nevada. In June, leaves on maple trees in Plumas and Sierra Counties along State Highways 49, 70 and 89 exhibited browning from the tips. Most of the foliage on these trees turned from the seasonal green to a bright orange-brown that one would expect in autumn. The condition was diagnosed as desiccation injury caused by the late cool and wet spring followed by hot windy weather. The saturated roots were damaged by the length of exposure and then unable to recover when the weather turned hot and windy. Desiccation injury in these areas was accompanied by a dramatic occurrence of leaf blight on oaks; discussed elsewhere in this report. The untimely change in color and loss of foliage in hardwoods over large areas raised a considerable amount of concern from residents. Most trees are expected to recover.

Scattered young ponderosa pine exhibited browning of older needles along Highway 299 just west of Moose Camp, Shasta County. Needle desiccation is suspected due to the exposed location and constant force of wind across Hatchet Pass. Moisture stress resulted in discolored ponderosa pine foliage in a plantation near Weed, Siskiyou County.

FLOODING

M261D - Southern Cascades . Several pines have been killed around McCoy and Hog Flat Reservoirs on the Eagle Lake District, Lassen National Forest from submersion by high water levels for continuous periods this spring and summer.

CANKER DISEASES

CYTOSPORA CANKER, caused by *Cytospora abietis*.

M261E - Sierra Nevada. Moderate to severe branch flagging due to Cytospora canker and red fir dwarf mistletoe (*Arceuthobium abietinum f.* sp. *magnificae*) was evident for several miles along Cherry Hill Road southeast of Big Meadow on the Cannell Ranger District, Sequoia National Forest. Up to 50% current live crown mortality was common and some tree mortality was present. This area has chronic mistletoe and Cytospora canker injury, but 1998 was worse than usual.

DIPLODIA BLIGHT OF PINES, caused by *Sphaeropsis sapinea* (*Diplodia pinea*).

M261A - Klamath Mountains, M261B - Northern California Coast Ranges, M261C - Northern California Interior Coast Ranges, M261D - Southern Cascades, M261E - Sierra Nevada, M261F - Sierra Nevada foothills, 262A - Great Valley. Wet spring weather during shoot elongation causes an increase in infections of Diplodia blight of pines. Wet springs occurred in 1993, 1995, and 1996. These successive or alternate yearly conditions apparently resulted in disease build-up and repeated yearly infections on susceptible trees. Frequent winter and spring storms due to El Niño and high inoculum levels from previous years favored the pathogen again in 1998. Shoot dieback caused by *Sphaeropsis sapinea* was observed on ponderosa pines at numerous locations in northern California: Weaverville, Trinity County; Whiskeytown National Recreation Area, Old Shasta, and Bella Vista, Shasta County; Sacramento River Canyon from mountain Gate to Dunsmuir, Shasta County; Paradise, Butte County; at various locations in El Dorado County from Camino and Placerville to Georgetown; and Manton, Tehama County. Diplodia blight was also seen at Boggs Mountain State Forest and the nearby community of Cobb, Lake County; Coffee Creek, Trinity County; and McCloud, Siskiyou County. At the Coffee Creek site, the initial report was for pitch canker, but an inspection confirmed only Diplodia. The two

diseases are easily confused.

Diseased trees were growing at elevations of roughly 1,000 to 2,500 feet. The range of observations suggest that disease was widespread at this elevational band. Mature and overmature trees were more likely to be infected. Individual trees varied considerably in the number of blighted twigs, with the most severely affected showing evidence of chronic infection and reduced vigor. Although heavily diseased trees were widely scattered, in some locations a majority of trees exhibited some degree of infection.

PITCH CANKER, caused by *Fusarium subglutinans f.* sp. *pini*.

261A - Central California Coast and 262A - Great Valley. Pitch canker was found for the first time in Solano County at a Christmas tree farm in Dixon, increasing the number of infested counties by one to 18. This represents a significant jump for the pathogen since this location is hotter and drier than any other known infected site. The trees appear to have become infected recently, as opposed to being infected when they were planted.

In February, a team of experts representing the North American Forestry Commission, a subcommittee of the United Nations Food and Agriculture Organization, visited California to gather information for a Pest Risk Assessment for pitch canker. The risk assessment was completed in the fall of 1998. Recent morphological and biochemical data suggest that *Fusarium subglutinans* should be named *Fusarium circinatum*.

The California Department of Forestry has monitored plots in Santa Cruz, Soquel and Watsonville since 1987. Of 97 Monterey pines alive at the beginning of the study, 41 remain. Most of these trees were killed by pitch canker and bark beetles or were removed because the disease heavily damaged them. A few were removed for other reasons. Of the remaining trees, most exhibit little evidence of active disease. This includes a number of trees that suffered substantial crown dieback, but now are experiencing a hiatus in new infections.

SCLEROPHOMA CANKER OF PINES , caused by *Sclerophoma* sp.

M261C - Interior California Coast Ranges. In May, a twig blight was noted on Aleppo and gray pines around the Redding Airport, Shasta County. Twigs in the lower half of tree crowns were killed. Although timing of the dieback is uncertain, it occurred on fully developed 1997 twigs. A canker similar to that caused by Diplodia blight was found in the dead twigs, but Diplodia blight typically kills developing shoots. A fungus, *Sclerophoma* sp., was isolated from the dead twigs.

FOLIAGE DISEASES

COTTONWOOD AND ASPEN LEAF AND SHOOT BLIGHT, *Pollaccia elegans* (*Venturia populina*) and *Colletotrichum gloeosporioides*.

M261D - Southern Cascades . Nearly all of the black cottonwood in Chester were affected by *Pollaccia elegans* and *C. gloeosporioides*, with some showing complete defoliation. These blights kill leaves and sometimes cause up to several inches of twig dieback. The trees in Chester refoliated during the summer. A leaf and shoot blight that appears similar to *Venturia* sp. caused leaf spots, defoliation and shoot dieback of quaking aspen along the Tom Young Road (FH 24) south of Hambone, northeastern Shasta County.

DOUGLAS-FIR NEEDLE CAST, caused by *Rhabdocline weirii*.

M261A - Klamath Mountains . Douglas-fir needle cast affected understory Douglas-firs over a wide area in the Salmon River drainage near Petersburg fire station on the Klamath National Forest.

M261E - Sierra Nevada. Loss of 1997 foliage from most of the Douglas-fir on a five-acre plantation occurred in the spring and early summer of 1998. The plantation was 15 years old and located on the Calaveras District, Stanislaus National Forest at an elevation of 4,500 feet. Naturally regenerated Douglas-fir adjacent to the plantation were not affected. Douglas-fir needle cast was also reported from the city of Mt. Shasta, Siskiyou County.

ELYTRODERMA DISEASE, *Elytroderma deformans*.

M261D - Southern Cascades . Elytroderma disease on ponderosa pine was noted at many locations along Highway 36 from Mineral to the west shore of Lake Almanor, including the following drainages: Battle, Mill, Gurnsey, Deer, around Manzanita Lake, and Lost Creeks. It was also common along Highway 89 west of Dead Horse Summit in the Upper McCloud River drainage and along Highway 89 in the northwest corner of Lassen Volcanic National Park. Heaviest infections are occurring near lakes and streams. Individual scattered pine trees (or groups) in the mixed-conifer forests are being heavily infected. These infections are suspected to

have resulted from one or more recent ``wave year'' events for this disease resulting from the unseasonably long and wet spring weather.

M262B - Southern California Mountains and Valleys. Elytroderma disease was widespread on Jeffrey pines in the are of Laguna Mountain, Descanso District, Cleveland National Forest.

OAK FOLIAGE DISEASES, caused by *Septoria quercicola* and *Cylindrosporium kelloggii*.

M261A - Klamath Mountains, M261B - Northern California Coast Ranges, M261C - Northern California Interior Coast Ranges, M261D - Southern Cascades, M261E - Sierra Nevada, M261F - Sierra Nevada Foothills, M261G - Modoc Plateau. A leaf spot is common on California black oak throughout northern California. Trees at the highest and lowest elevations of the species appear least affected. *Septoria quercicola* was isolated from samples collected near French Gulch, Shasta County, but *Cylindrosporium kelloggii* was isolated from other locations. Both fungi produce similar symptoms and are implicated in the extensive outbreak. Leaves were covered with brown spots and curled at the edges. Many turned brown and fell from the trees. In some cases entire hillsides were blanketed with brown tree crowns. Late spring and early summer rains apparently favored infection.

BLUE OAK LEAF SPOT, cause unknown.

M261C - Northern California Interior Coast Ranges. A leaf spot was common on blue oaks in the northern end of the Sacramento Valley, Shasta County, but damage was not serious enough to cause significant defoliation. Many trees produced a second flush of foliage, which often showed signs of powdery mildew. Casual agents were not identified.

TRUE FIR NEEDLE CAST, caused by *Lirula abietis-concoloris*.

M261E - Sierra Nevada. Sapling and pole-size white fir in the Clark Fork drainage on the Summit District, Stanislaus National Forest were affected by true fir needle cast. Foliage produced in 1997 was dead, although much of it was still retained on the twigs. The affected location was near Clark Fork Campground. The wet winter and late spring is assumed to have produced conditions favorable to this fungus.

M262B - Southern California Mountains and Valleys. True fir needle cast was scattered along State Route 38 in both the Front Country and the Mountain Top Districts, San Bernardino National Forest**.**

ROOT DISEASES

ARMILLARIA ROOT DISEASE, caused by *Armillaria* spp.

M261B - Northern California Coast Ranges. On a pre-harvest inspection near Loch Lomand, Lake County, an Armillaria root disease center in Douglas-fir was noted. Dead and dying black oaks were also in the center.

BLACK STAIN ROOT DISEASE, caused by *Leptographium wageneri*.

M261A - Klamath Mountains . Pockets of black stain root disease were found in ponderosa pine in an overstocked mixed-conifer stand at the crest near Slate Mountain along the Shasta and Trinity County line west of Interstate 5.

M261D - Southern Cascades . More black stain root disease centers were found in ponderosa pine half a mile north of Poison Lake, Lassen National Forest. The centers range in size from a few trees to about a tenth of an acre. The disease was first identified in California about a mile from these centers.

DWARF MISTLETOES, caused by *Arceuthobium* spp.

M262B - Southern California Mountains and Valleys. Dwarf mistletoes continue to be a serious problem in recreation areas throughout Southern California. The USDA-Forest Service is planning the following dwarf mistletoe management projects: 1) Buckhorn Campground, Los Angeles River District, Angeles National Forest; 2) Laguna Mountain Recreation Area, Descanso District, Cleveland National Forest; 3) Mt. Pinos Recreation Area and Organizational camps, Mt. Pinos District, Los Padres National Forest; 4) Pine Mountain and Reyes Peak campgrounds, Ojai District, Los Padres National Forest; 5) several campgrounds and picnic areas on the San Bernardino National Forest.

TRUE MISTLETOES, caused by *Phoradendron* spp.

M262B - Southern California Mountains and Valleys. Leafy mistletoes (*Phoradendron* spp.) continue to cause dieback and decline

in both hardwoods and conifers in developed recreation sites on all National Forests in Southern California.

The USDA-Forest Service, in conjunction with the USDI-Bureau of Indian Affairs, is planning to do true mistletoe management projects on 1) live oaks and cottonwoods on the Manzanita Indian Reservation (San Diego County) and 2) white fir in the Deer Flats Group Campground, San Gabriel River Ranger District (Los Angeles County).

RUST DISEASES

LIMB RUST ON JEFFREY PINE, caused by *Peridermium stalactiforme*.

M261E - Sierra Nevada. Limb rust is infecting Jeffrey pine on Little Truckee Summit on the Sierraville District, Tahoe National Forest. Lower branches on young pine less than 35 feet in height are most heavily infected. The infections appear to be confined to the branches except on pine trees less than about 10 feet in height, where bole infections can be found.

WESTERN GALL RUST, caused by *Peridermium harknessii*.

M261E - Sierra Nevada. Western gall rust is infecting large ponderosa pine along the South Yuba River above the town of Washington in the Tahoe National Forest. Numerous branches have been girdled and killed by the galls on a few trees.

263A - Northern California Coast and M261B - Northern California Coast Ranges. Branch flagging associated with infections of western gall rust continues to be quite common along the north coast from Bodega Bay (Sonoma County) to Rockport (Mendocino County) on planted Monterey pines and native Bishop pines. Gall rust is also quite common on ponderosa pine at Boggs Mountain State Forest, Lake County.

INCENSE-CEDAR RUST, caused by *Gymnosporangium libocedri*.

M261A - Klamath Mountains . Incense-cedars along the Scott Mountain Summit on Highway 3 in Siskiyou County were heavily covered with spores in the spring due to the wet weather. Incense-cedar rust was also reported from Shingletown, Shasta County.

WHITE PINE BLISTER RUST, caused by *Cronartium ribicola*.

M261E - Sierra Nevada. White pine blister rust caused branch and tree mortality in three Southern Sierra Nevada locations: 1) just south of Whitaker Forest on the Hume Lake District, Sequoia National Forest where blister rust killed seedling and sapling-size sugar pine at an elevation of 5,100 feet, 2) along Rancheria Road, 4.9 miles south of Greenhorn Summit, Greenhorn District, Sequoia National Forest. This may represent the most southern confirmation of blister rust on pine in the Sierra Nevada. A third situation involved a 15-year-old plantation on the Groveland District, Stanislaus National Forest that was established to revegetate the Granite Burn. The plantation is predominantly sugar pine with ponderosa pine and giant sequoia. Blister rust has infected most of the sugar pine and has killed about 20% of the planted trees. Cankers representing at least three different infection years, between 1983 and 1993, are present. Although some pines were infected at a very early age, the excellent site quality has allowed many of them to grow and survive even with ``lethal'' infections.

White pine blister rust has also been identified on the east slope of Babbitt Peak on western white pine in the Toiyabe National Forest nine miles southeast of Loyalton, CA. The infections occur in an old-growth stand of pure western white pine. Blister rust is also infecting old western white pine on Haskell Peak on the Plumas National Forest, eleven miles southwest of Portola. The infections are believed to be contributing to the top dieback observed in some of the trees.

MISCELLANEOUS REPORTS

¾Cypress canker, caused by *Seridium cardinale*, was confirmed from declining Italian cypress at a residence in Redding. Trees exhibited branch tip dieback in the lower three-quarters of the crown.

¾Ponderosa pine was damaged by treatment with the herbicide hexazinone at Roseburg's Bear Canyon Plantation near Round Mountain, Shasta County. Incense cedar and Douglas-fir in the plantation were largely unaffected.

¾Decline and mortality of coast live oak in the Ross-San Anselmo area, Marin County, was attributed to various canker and decay fungi.

¾The cause of branch dieback on young Jeffrey pine in the Tahoe Keys, South Lake Tahoe, El Dorado County, is undetermined.

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST. In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density - 40, 55, 70 and 100 percent of normal basal area-were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have reached when fully stocked with trees, which in the demonstration areas, ranges from 185 to 215 sq ft/ac, depending on site quality.) Nineteen years after thinning, the treatments had reduced mortality from 90 to 100 percent of the level in unthinned stands (Table 1).

Table 1. Commercial Tree Mortality by Stocking Level, Nineteen Years after Thinning by year and four percentages

Residual Stocking After Thinning				
Year	**40%**	**55%**	**70%**	**100%**
	(Dead Trees per Acre)			
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
1994	0.0	0.0	0.0	4.8
1995	0.0	0.0	0.3	0.4
1996	0.0	0.2	0.0	1.3
1997	0.0	0.2	0.0	1.3
1998	0.0	0.0	0.0	0.0
Mean	0.0	0.1	0.1	2.1
Range	0.0	0-0.5	0-0.8	0.0-5.2
Percent Mortality Reduction Compared with Normal				
Basal Area	100	95.2	95.2	C

a Commercial trees are 8 inches d.b.h. and larger, with straight boles, yielding at least one 10-foot log with a 6-inch top. Trees were killed by the mountain pine beetle.

b Percent of normal basal area.

AERIAL SURVEY OF FOREST TREE MORTALITY IN CALIFORNIA IN 1998. Forest tree mortality continued to decline throughout California in 1998. In addition to mortality determined by plotting mortality spots observed from the air and evaluated with vegetation and stocking data, other classifications of mortality were reported. The Modoc National Forest reported 193 acres of defoliation that affected 0.18 MBF of fir. The Stanislaus National Forest reported mortality from prescribed fire and wildfire on 2,615 acres and the Six Rivers National Forest reported mortality caused primarily by dwarf mistletoe on 6,858 acres. Aerial survey was not conducted in southern California.

Two of the major national parks also reported mortality. Sequoia Kings Canyon National Park reported 2,038 acres with pine mortality and 1,662 acres with fir mortality. Yosemite National Park reported 43,597 acres with pine mortality and 366 acres with fir mortality.

Table 2. Pine and Fir Mortality in California's National Forests as Determined by Aerial Survey in 1998.

Tree Group - Pine Fir

Area	Acres	Volume (MMF)	Acres	Volume (MMBF)
Northern California	4,433	1.6122	18,114	15.542
Northeastern California	615	0.25	817	0.03
Central/Southern Sierras	5,569	3.84	5,358	6.24
TOTALS	10,617	5.702	24,812	21.81

THE 1998 COOPERATIVE DOUGLAS-FIR TUSSOCK MOTH PHEROMONE DETECTION SURVEY. Average trap catches of male Douglas-fir tussock moths (DFTM) for 1998 showed increases at several plots compared to 1997 catches (Table 3). Data were collected for 159 plots (five traps per plot) during 1998. Of these, 114 plots (72%) had fewer than an average of 25 males per trap and 45 (28%) averaged 25 or more moths per trap. For several plots this is an upward trend from average counts recorded in 1997. Plots which averaged 25 moths per trap for 1998 were located on the following Ranger Districts:

Ranger District	Forest
Georgetown and Placerville	Eldorado
Downieville and Nevada City	Tahoe
Mt. Hough	Plumas
Almanor and Eagle Lake	Lassen
Big Valley	Modoc
Mariposa	Sierra
Greenhorn and Hume Lake	Sequoia

In addition to these plots monitored on National Forest lands, five plots monitored by the California Department of Forestry averaged 25 moths per trap.

Increases and declines in trap counts are very common. Although significant activity by DFTM is not anticipated within areas monitored by the plot system during 1999, field-going personnel are urged to continue to monitor for evidence of feeding and defoliation on white fir throughout the susceptible host type. Federal and state forest pest management personnel will continue to monitor all life stages at established monitoring sites and in the areas where DFTM activity exceeded an average of 25 males/trap. Forest managers may want to consider establishing additional pheromone plots in areas of susceptible host type.

Table 3. Number of Douglas-fir Tussock Moth Pheromone Detection Survey Plots by Trap Catch, 1979 to 1998.

Year	Total Plots	No. of Plots with an average Moth Catch per Trap of:													
		0<10	10<20	20<25	25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
1979	102	97	2	1	1	0	1	0	0	0	0	0	0	0	0
	100%	95%	2%	1%	1%	-	1%	-	-	-	-	-	-	-	-
1980	99	99	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	100%	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	93	78	10	4	1	0	0	0	0	0	0	0	0	0	0
	100%	84%	10%	4%	2%	-	-	-	-	-	-	-	-	-	-
1982	95	93	1	0	1	0	0	0	0	0	0	0	0	0	0
	100%	98%	1%	-	1%	-	-	-	-	-	-	-	-	-	-
1983	98	87	6	1	1	3	0	0	0	0	0	0	0	0	0
	100%	89%	6%	1%	1%	3%	-	-	-	-	-	-	-	-	-
1984	111	51	18	11	5	7	8	4	3	4	0	0	0	0	0
	100%	46%	16%	10%	4%	6%	7%	4%	3%	4%	-	-	-	-	-
1985	105	58	14	4	7	6	5	1	2	4	1	2	0	1	0
	100%	55%	13%	4%	7%	6%	5%	1%	2%	4%	1%	2%	-	1%	-
1986	107	64	16	4	8	6	1	3	0	1	0	1	1	1	1
	100%	60%	16%	3%	7%	6%	1%	3%	-	1%	-	1%	1%	1%	1%
1987	108	80	15	4	2	1	1	3	0	1	0	0	1	0	0
	100%	74%	14%	4%	2%	1%	1%	2%	-	1%	-	-	1%	-	-
1988	124	105	9	3	3	0	2	1	0	0	0	0	0	0	0
	100%	86%	7%	2%	2%	-	2%	1%	-	-	-	-	-	-	-
1989	130	129	1	0	0	0	0	0	0	0	0	0	0	0	0
	100%	99%	1%	-	-	-	-	-	-	-	-	-	-	-	-
1990	138	135	1	0	1	1	0	0	0	0	0	0	0	0	0
	100%	97%	1%	-	1%	1%	-	-	-	-	-	-	-	-	-
1991	143	135	4	1	0	0	2	1	0	0	0	0	0	0	0
	100%	94%	3%	1%	-	-	1%	1%	-	-	-	-	-	-	-
1992	164	156	3	0	2	1	0	0	0	0	1	0	1	0	0
	100%	95%	1%	-	1%	1%	-	-	-	-	1%	-	1%	-	-
1993	143	135	8	0	0	0	0	0	0	0	0	0	0	0	0
	100%	94%	6%	-	-	-	-	-	-	-	-	-	-	-	-
1994	151	139	11	1	0	0	0	0	0	0	0	0	0	0	0
	100%	92%	7%	1%	-	-	-	-	-	-	-	-	-	-	-
1995	158	77	35	13	16	7	7	3	0	0	0	0	0	0	0

	100%	49%	22%	8%	10%	4.5%	4.5%	2%	-	-	-	-	-	-	-
1996	149	33	26	16	8	7	12	9	5	8	6	8	5	1	5
	100%	22%	17%	11%	6%	4%	8%	6%	3%	6%	4%	6%	3%	1%	3%
1997	142	88	27	10	9	4	3	0	0	1	0	0	0	0	0
	100%	62%	19%	7%	6%	3%	2%	-	-	1%	-	-	-	-	-
1998	159	81	22	11	9	6	3	10	7	5	2	1	1	1	0
	100%	51%	14%	7%	6%	3%	2%	6%	4%	3%	1%	<1%	<1%	<1%	-

DWARF MISTLETOE RESISTANCE IN JEFFREY PINE

The planting of dwarf mistletoe-resistant Jeffrey pine near Grover Hot Springs State Park, Lake Tahoe Basin, was examined in 1998. The overall tree survival was 30.7%. The local susceptible seed source is surviving at about twice the level of the Foresthill resistant seed source. Four of 60 live resistant seedlings, and nine of 49 live susceptible seedlings are infected with dwarf mistletoe.

WHITE PINE BLISTER RUST RESISTANCE SCREENING PROGRAM

Progeny of 1,128 sugar pine trees were grown, inoculated, and evaluated for major gene resistance (MGR) to white pine blister rust at the greenhouses located at the Placerville Nursery. Fifty-four new resistant families were identified from this evaluation, bringing the total number of MGR trees in the program to 1,095. Western white pine (97 families) and whitebark pine (49 families) were also included in the screening program for the first time.

For the next cycle of screening, progeny of 805 sugar pine trees were grown and inoculated and are ready to be evaluated for MGR. An additional 50 families of western white pine and two families of whitebark pine were sown and are being grown for blister rust evaluation.

In the spring of 1998, 6,868 proven MGR seedlings were planted at the Happy Camp site for long-term evaluation of the mechanisms of multi-gene resistance to blister rust. The program has also completed the scoring of seven plantations located throughout the Sierra Nevada and northwestern California. These plantations are used to monitor the performance of MGR planting stock against the expected levels of resistance.

LODGEPOLE PINE NEEDLEMINER IN YOSEMITE NATIONAL PARK

``The increasing needleminer population trend at plots in the Tenaya Lake Basin noted in the last two years is again evident. Present population densities at Upper Tenaya, Cathedral Creek South, Tenaya Beach and Tenaya P.A. are nearly high enough to cause visible defoliation in 1999. Mortality during earlier outbreaks has removed most of the large old trees in the Tenaya Basin. The younger trees remaining have not had significant defoliation for many years and are in good condition to tolerate the anticipated level of needleminer feeding.

``The population densities at the May Lake and Olmstead #1 plots continue to decline. Trees at these plots have been seriously defoliated since 1989, greatly reducing foliage production. The needleminer populations at both these areas, although reduced, should be expected to again completely defoliate the trees. Tree mortality has started and will continue at both plots. The defoliated areas represented by both of these plots extend to Highway 120 and travelers on the highway are expected to notice `red trees'.

``The Budd Creek and Cathedral Lake plots both registered large population increases in October. Over winter mortality was unusually low, 14% at Budd Creek and 17.4% at Cathedral Lake. During the last three generations first winter mortality averaged 32.4% at Budd Creek and 35.2% at Cathedral Lake. The sharply increasing needleminer population probably is a result of female moths being carried over Cathedral Pass by the prevailing evening winds during the flight period last summer. The low over winter mortality of the newly established larvae might be a result of unusually warm temperatures last winter, however the remainder of the plots show normal first winter mortality. The area represented by the Cathedral Lake plot is on the high sierra loop trail and travelers on the trail might notice defoliation in 1999. No tree mortality is anticipated in either area in the immediate future.

``In summary, needleminer population densities continue to increase in the Tenaya Lake Basin and along Highway 120 west of Tenaya

Lake. Increased areas of visible defoliation are to be anticipated, but little or no tree mortality is to be expected in the immediate future. Population densities remain low in the heavy visitor use area around Tuolumne Meadows and no visible defoliation is expected in the next four to six years. Extensive areas with high needleminer populations and heavy defoliation are known to exist both north and south of Tuolumne Meadows and spread of wind borne moths on prevailing evening winds from the southwest might rapidly increase needleminer infestation in the Tuolumne Meadows area. An aerial survey to be conducted later in the summer is expected to provide an update on the situation in the backcountry adjacent to the heavy use zones." (Unpublished report to Yosemite National Park by Dr. Thomas W. Koerber, Entomological Service Company, Box 992, Berkeley, CA 94701. The Council thanks Dr. Koerber and Yosemite National Park for making this information and the following table available for this conditions report.)

Table 4. Lodgepole Pine Needleminer Population Density at Traditionally Sampled Locations within Yosemite National Park, Live Needleminers per 100 Tips, June 1998

PLOT	YEAR				%CHANGE 1996 to 1998
	1991	1994	1996	1998	
Upper Tenaya	32	90	382	380	
Cathedral Creek West	28	18	36	80	
Cathedral Creek South	18	52	274	658	
Cathedral Creek East	10	22	14	48	
May Lake	1,222	2,204	1,708	962	
Dog Lake	22	8	44	32	
West Lyle	8	2	6	20	
Kuna	32	20	36	28	
	171.5	302.5	312.5	275.2	-11.9%
Budd Creek	98	80	216	896	
Cathedral Creek	68	92	248	704	
Dingley Creek	16	14	32	74	
Delaney Creek	48	150	140	128	
Dana Meadow	12	ND	ND	2	
	48.4	67.2	134.4	360.8	+168.5%
Olmstead #1	2,216	3,010	1,236	542	
Olmstead #2	98	42	94	42	
Murphy Cr. Weather Station	34	12	46	48	
Lower Tenaya	6	4	44	72	
Mt. Hoffman	46	14	24	24	
Bear Pitts	36	02	52	28	
	406.0	517.0	249.3	126.0	-67.5%
Lembert Dome	18	14	6	16	
Campground	2	ND	14	4	
Plot G	14	2	24	78	
Plot H	16	ND	10	10	
Base Camp	30	26	18	24	

Plot A	4	4	12	2	
Plot O	8	26	20	12	
Tenaya Beach	50	32	34	228	
Tenaya P.A.	102	34	160	202	
	27.1	15.6	33.1	64.0	+93.3%

DETECTING VEGETATION CHANGES IN CALIFORNIA USING SATELLITE IMAGERY, Assessment of mortality conditions for the Northeastern project area.

The USDA-Forest Service and the California Department of Forestry and Fire Protection have been cooperating on a statewide change detection program covering California over a five-year period using satellite imagery. The state is divided into five project areas. The goal of the program is to implement a long-term, low-cost monitoring program to identify trends in forest health and assess changes in vegetation extent and composition. A two phased approach is used to a) describe broad landscape changes between two points in time, and b) determine the causes of those changes. Changes are derived from two dates of satellite imagery. Causes of change are attributed in a GIS from ancillary data and field work. Areas of mortality are identified using aerial photography, aerial survey data, and additional information provided from landowners. These areas are sampled on the ground using a keyhole plot design with a 165 foot transect to capture current mortality. Field data is correlated with the change map using regression analysis. R-square values correlating percent loss in canopy in mixed-conifer fir type was 0.85, 0.65 for the mixed conifer pine type, and 0.72 for the ponderosa pine type. An R-square value of 1 would represent a perfect correlation, or 100% confidence, for a given mapped area of mortality. These regression values demonstrate that the models predict mortality well in the Northeastern area of California. Southern California and the Central Coast are currently being analyzed; reports will be available early next year.

More information on detecting vegetation changes in California using satellite imagery may be found at frap.cdf.ca.gov (navigate via current project to the USFS-CDF change detection project).

LIST OF COMMON AND SCIENTIFIC NAMES

INSECTS

Common Name Scientific Name

Bark Beetles

Douglas-fir beetle *Dendroctonus pseudotsugae*

Fir engraver *Scolytus ventralis*

Jeffrey pine beetle *Dendroctonus jeffreyi*

Monterey pine ips *Ips mexicanus*

Mountain pine beetle *Dendroctonus ponderosae*

Pine engravers *Ips* spp.

Pinyon ips *Ips confusus*

Red turpentine beetle *Dendroctonus valens*

Western pine beetle *Dendroctonus brevicomis*

Defoliation

California budworm *Choristoneura carnana californica*

Douglas-fir tussock moth *Orgyia pseudotsugata*

Fruittree leafroller *Archips argyrospilus*

Gypsy moth *Lymantria dispar*

Lodgepole pine needleminer *Coleotechnites milleri*

Modoc budworm *Choristoneura retiniana*

Satin moth *Stilanotia salicis*

Cedar scale *Xylococculus macrocarpae*

Tree regeneration insects

Branch and twig beetles *Carphoborus pinicolens*

Pityophthorus tuberculatus

Pine needle sheathminer *Zelleria haimbachi*

Pine reproduction weevil *Cylindrocopturus eatoni*

Other

Africanized honey bee *Apis mellifera scutellata*

Alder flea beetle *Macrohaltica ambiens*

Cedartree borer *Semanotus ligneus*

Elm leaf beetle *Xanthogaleruca luteola*

Pine needle weevil *Scythropus elegans*

Roundheaded fir borer *Tetropium abietis*

DISEASES AND PATHOGENS

Common Name of the Disease Scientific Name of Pathogen

Cankers

Cytospora canker *Cytospora abietis*

Diplodia blight of pines *Sphaeropsis sapinea* (*Diplodia pinea*)

Pitch canker *Fusarium subglutinans* f.sp. *pini*

Phomopsis canker *Diaporthe lokoyae*

Sclerophoma canker of pines *Sclerophomas* sp.

Dwarf mistletoes

Red fir dwarf mistletoe *Arceuthobium abietinum* f.sp. *magnificae*

Foliage diseases

Blue oak leaf spot unknown

Cottonwood and aspen leaf and shoot blight *Pollaccia elegans* (*Venturia populina*)

Colletotrichum gloeosporioides

Douglas-fir needle cast *Rhabdocline weirii* ssp. *weirii*

Elytroderma needle disease *Elytroderma deformans*

Fir needle cast *Lirula abietis-concoloris*

Fusarium hypocotyl rot *Fusarium* spp.

Leaf spot of arbutus *Coccomyces arbutifolius*

Oak foliage diseases *Septoria quercicola*

Cylindrosporium kelloggii

Sycamore anthracnose *Apiognomonia veneta*

Root diseases

Annosus root disease *Heterobasidion annosum*

Armillaria root disease *Armillaria* spp.

Black stain root disease *Leptographium wageneri*

Rusts

Limb rust on Jeffrey pine *Peridermium stalactiforme*

Western gall rust *Peridermium harknessii*

Incense-cedar rust *Gymnosporangium libocedri*

White pine blister rust *Cronartium ribicola*

True mistletoes

White fir mistletoe *Phoradendron pauciflorum*

TREES

Common Name Scientific Name

Conifers

Pines

Aleppo pine *Pinus halepensis*

Bishop pine *Pinus muricata*

Gray pine *Pinus sabiniana*

Jeffrey pine *Pinus jeffreyi*

Knobcone pine *Pinus attenuata*

Lodgepole pine *Pinus contorta* var. *murrayana*

Monterey pine *Pinus radiata*

Ponderosa pine *Pinus ponderosa*

Singleleaf pinyon *Pinus monophylla*

Sugar pine *Pinus lambertiana*

Western white pine *Pinus monticola*

whitebark pine *Pinus albicaulis*

True firs

Red fir *Abies magnifica*

White fir *Abies concolor*

Others

Douglas-fir *Pseudotsuga menziesii*

Incense-cedar *Libocedrus decurrens*

Port-Orford-cedar *Chamaecyparis lawsoniana*

Hardwoods

Oaks

Blue oak *Quercus douglasii*

California black oak *Quercus kelloggii*

Other

Aspen *Populus tremuloides*

Black cottonwood *Populus trichocarpa*

Cottonwood *Populus* spp.

Elms *Ulmus* sp.

Juniper *Juniperus* sp.

Willow *Salix* sp.

PUBLICATIONS

Owen, D. 1998. Health concerns for California's native Monterey pine forests. Fremontia, J. of the Calif. Native Plant Soc., Vol. 26, No. 3:17-19

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